



# Mu2e II - TDAQ LOIs and mini-workshop

Mu2e-II Workshop  
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## Mu2e II - Trigger/DAQ group members

- Gianantonio Pezzullo, Convenor, Yale
- Antonio Gioiosa, Convenor, INFN Pisa
- Rebecca Chislett, UCL
- Ryan Rivera, FNAL



# Mu2e II - Trigger/DAQ group Channels

- Mailing list [mu2e-ii-tdaq@listserv.fnal.gov](mailto:mu2e-ii-tdaq@listserv.fnal.gov)
- SLACK #mu2eii\_tdaq  
<https://snowmass2021.slack.com/archives/C017LHSCVQR>



# Letters of Interest (Lols) proposal

Our goal is to outline in a 2 pages document the conceptual idea of an exciting R&D program for the TDAQ system

We are proposing distinct assumptions in three different papers, because there is not yet a clear understanding of the beam conditions or of the detector setup:

1. Scale-up the Mu2e system: *assuming x2 improvement in technology performance, that would mean x5 the current hardware*
2. Two level system: *hardware L1 on GPU + HLT*
3. Two level system: *hardware L1 on FPGA + HLT*



# Letters of Interest (Lols) proposal

## Paper sections

- Intro: *short description of the Mu2e-II proposal and motivations*
- Mu2e-II TDAQ requirements: *expected rates, required rejection, etc*
- From Mu2e to Mu2e-II: *super short description of the Mu2e TDAQ system and proposal*



# Letters of Interest (Lols) proposal

At the following links there are the three overleaf docs we finalized

- **SCALE UP**

<https://www.overleaf.com/4494769535mbpggbingpkt>

- **GPU**

<https://www.overleaf.com/1195943198qrwhwdvyhtfd>

- **FPGA**

<https://www.overleaf.com/9669925525vjrgwigxpvwf>



# Mini Workshop Main goals

Provide an overview of:

- *Mu2e TDAQ LOIs*
- *possible TDAQ infrastructures*
- *trigger algorithms*

Scheduled on September 14, 2020:

<https://indico.fnal.gov/event/45146/timetable/#20200914>



# TDAQ systems with high trigger rejection

- From Mu2e to Mu2e-II requirements
  - Ryan Rivera (Fermilab)
    - Mu2e TDAQ L2 R&D
    - CMS TDAQ DR&D

(<https://www.sciencedirect.com/science/article/pii/S0168900215015521?via%3Dihub>)
- ATLAS Trigger experience
  - Catrin Bernius (SLAC)
    - current Trigger convener for ATLAS (<https://aip.scitation.org/doi/abs/10.1063/1.4953304>)
    - Long time experiences on triggers R&D in HEP
- ATLAS Fast TracKer (FTK)
  - Lauren Tompkins (Stanford)
    - FTK Leader (<https://cds.cern.ch/record/1552953>)
- CMS Trigger experience
  - Isobel Ojalvo (Princeton)
    - CMS L1 Trigger expert
    - Long time experiences on triggers R&D for experimental searches of new phenomena in HEP



# TDAQ infrastructures

- GPU + HLT
  - Gianluca Lamanna (Pisa University)
    - GPU architecture for NA62 HLT R&D (<https://journals.aps.org/prd/abstract/10.1103/PhysRevD.82.053010>)
    - GPU expert on real-time Applications in HEP

# Trigger algorithm & Online reco

- Retina algorithm
  - Giovanni Punzi et al (Pisa University)
    - RETINA trigger algorithm applied in LHCb R&D ([https://www.epi-conferences.org/articles/epiconf/abs/2016/22/epiconf\\_dots2016\\_00005/epiconf\\_dots2016\\_00005.html](https://www.epi-conferences.org/articles/epiconf/abs/2016/22/epiconf_dots2016_00005/epiconf_dots2016_00005.html))
    - Long time experience on real-time reconstruction in CERN Experiments using FPGAs